

Wisconsin

Wisconsin had the eighteenth largest population and the twenty-fourth largest utility generating capability in 1996. Most of the electricity generated in the State comes from coal-fired plants. Four of the five largest plants in the State are coal-fired, including Pleasant Prairie, the largest. Wisconsin also relies on its two nuclear power plants, Kewaunee and Point Beach. The Point Beach plant is the third largest plant in the State. All of the five largest plants are close to the shore of Lake Michigan. The largest utility in the State, the Wisconsin Electric Power Company, operates three of the four largest plants. In 1996, retail electricity was sold by 12 investor-owned, 82 publicly owned, and 26 cooperative utilities in Wisconsin. The average price of electricity, 5.25 cents per kilowatthour, was tenth least expensive in the Nation. The largest utilities in terms of retail sales were Wisconsin Electric Power, Wisconsin Power & Light, and the Wisconsin Public Service Corporation. Wisconsin is a net importer of electricity.

Unlike neighboring Illinois, which has large coal deposits, most of Wisconsin's coal is imported from other States, including Illinois. In 1996, Wyoming coal accounted for 74 percent of utility coal consumption in Wisconsin. In 1986, utility coal units represented 64.8 percent of Wisconsin's generating capability and 64.1 percent of its net generation. In 1996, the coal share of capability had fallen to 59.3 percent, while the net generation share rose to 70.0 percent. Nuclear capability and net generation, on the other hand, were 13.5 percent and 24.7 percent, respectively, in 1986. By 1996, the nuclear shares had fallen to 11.6 percent and 18.6 percent, respectively. Wisconsin's nuclear plants have a capability weighted average age of 24 years, and are among the oldest in the Nation. Both the Wisconsin Public Service Corporation, the operator of Kewaunee, and the Wisconsin Electric Power Company (WEPCO), operator of Point Beach, are contemplating license renewal for their respective nuclear units. The owners of the Kewaunee plant have approved steam generator replacement of the unit.¹ The agreement should assure Kewaunee operation through 2013, and perhaps open the door for license

renewal.² WEPCO is currently mulling over its options concerning Point Beach.³ Relicensing costs could reach \$200 million for Point Beach.⁴

The Clean Air Act Amendments of 1990 specified a number of utility plants to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x). Cited in the law were 2,038 megawatts of nameplate capacity at three Wisconsin plants. Emissions of SO₂, NO_x, and carbon dioxide (CO₂) in Wisconsin ranked seventeenth, fifteenth, and eighteenth, respectively, in 1996. In 1996, SO₂ emissions totals were less than they were in 1986. Emissions of both NO_x and CO₂ increased in both time periods. The rise in the second time frame was not as great, however. It is likely that Wisconsin will need to design a State implementation plan (SIP) for reducing ground-level ozone in response to a proposal released by the Environmental Protection Agency (EPA) in October 1998. The EPA SIP call proposal does not mandate which sources must reduce pollution. However, EPA states that utilities would be one of the most likely sources of NO_x emissions reductions.

Wisconsin has not moved as quickly toward restructuring its electric power industry as some States that have higher electricity prices. In November 1997, the Wisconsin Public Service Commission (PSC) issued its final decision on restructuring. The plan does not recommend retail access before 2000, but focuses on improving the utility infrastructure. Recommendations include improving transmission facilities, removing barriers to open transmission access, developing an independent system operator ISO, promoting construction of merchant plants, and promoting the development of renewable energy resources.⁵ In April 1998, Wisconsin passed a law to improve reliability and prevent power shortages by establishing a competitive merchant plant generating industry and creating a regional ISO. The law allows merchant plants up to 100 megawatts in size to be built without PSC approval.

¹ A steam generator acts as a heat exchanger, sending high pressure steam to the turbine.

² Wayne Barber, "Wisconsin Regulator Okays Kewaunee Ownership Deal", *Nucleonics Week*, (July 9, 1998), p. 2.

³ Pete Millard, "WEPCO Considers Costly Relicense for Nuclear Plant," *Business Journal-Milwaukee*, (July 31, 1998), p. 1.

⁴ *Ibid.*

⁵ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

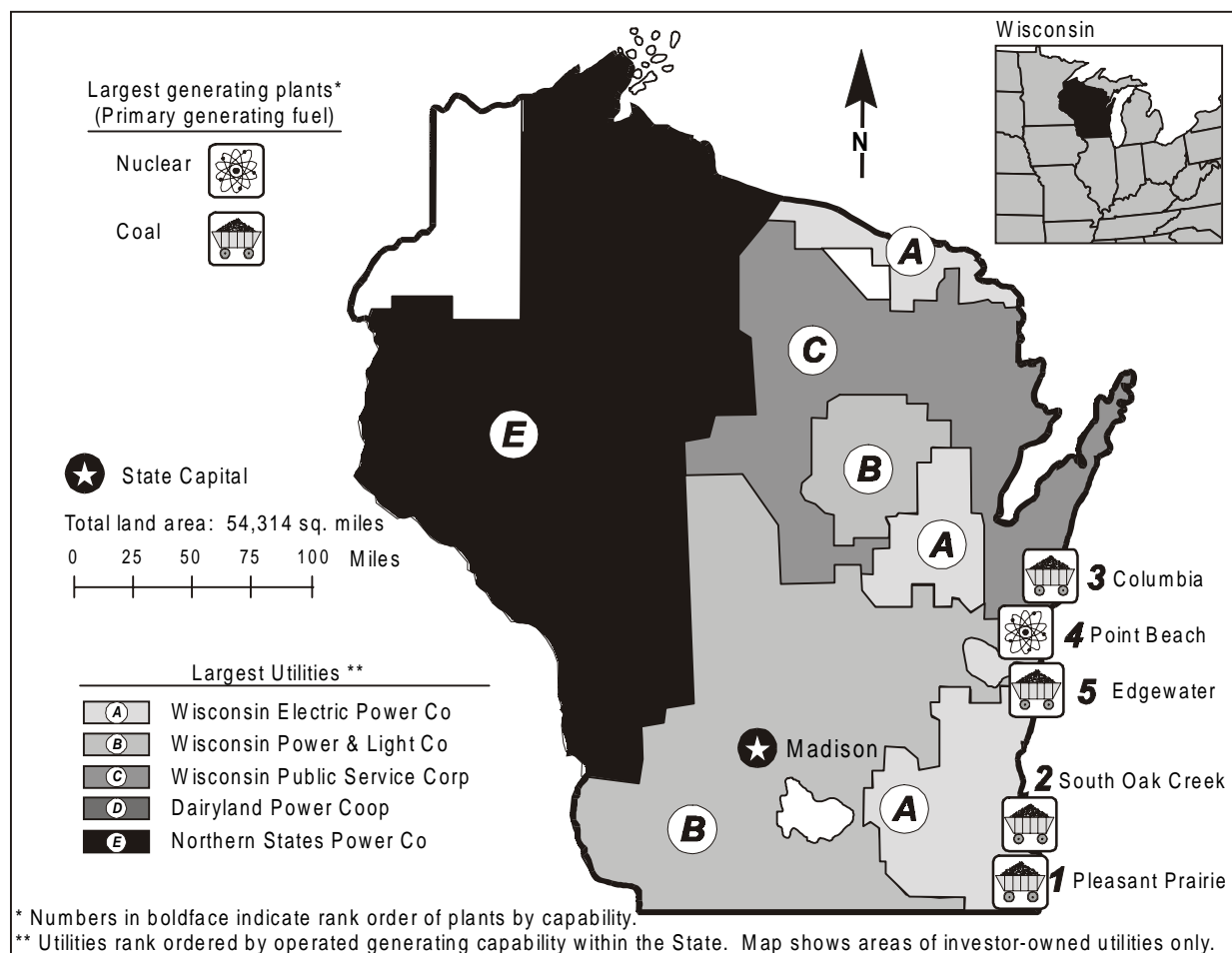


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		MAIN/MAPP	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	11,867	24
State Primary Generating Fuel		Coal	Generation (MWh)	51,651,435	22
Population (as of 7/96)	5,146,199	18	Average Age of Coal Plants	26 years	
Average Revenue (cents/kWh)	5.25	^a 10	Average Age of Oil-fired Plants	23 years	
Industry			Average Age of Gas-fired Plants	9 years	
Capability (MWe)	12,449	^b 22	Average Age of Nuclear Plants	24 years	
Generation (MWh)	54,463,471	^b 20	Average Age of		
Capability/person			Hydroelectric Plants	48 years	
(KWe/person)	2.42	^b 32	Average Age of Other Plants	45 years	
Generation/person			Nonutility^c		
(MWh/person)	10.58	^b 31	Capability (MWe)	582	27
Sulfur Dioxide Emissions			Percentage Share of Capability	4.7	29
(Thousand Short Tons)	244	17	Generation (MWh)	2,812,036	27
Nitrogen Oxide Emissions			Percentage Share of Generation	5.2	29
(Thousand Short Tons)	187	15			
Carbon Dioxide Emissions					
(Thousand Short Tons)	52,458	18			
Sulfur Dioxide/sq. mile (Tons)	4.50	26			
Nitrogen Oxides/sq. mile (Tons)	3.44	21			
Carbon Dioxide/sq. mile (Tons)	965.83	26			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Pleasant Prairie	Coal	Wisconsin Electric Power Co	1,200
2. South Oak Creek	Coal	Wisconsin Electric Power Co	1,155
3. Columbia	Coal	Wisconsin Power & Light Co	1,050
4. Point Beach	Nuclear	Wisconsin Electric Power Co	950
5. Edgewater	Coal	Wisconsin Power & Light Co	818

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Wisconsin Electric Power Co	4,811	2,941	249	684	934	3
B. Wisconsin Power & Light Co	2,885	2,255	189	401	--	41
C. Wisconsin Public Service Corp . .	1,688	884	8	232	515	49
D. Dairyland Power Coop	982	961	--	--	--	21
E. Northern States Power Co	901	45	484	12	--	360
Total	11,267	7,086	930	1,329	1,449	474
Percentage of Industry Capability	90.5	--	--	--	--	--

-- = Not applicable.

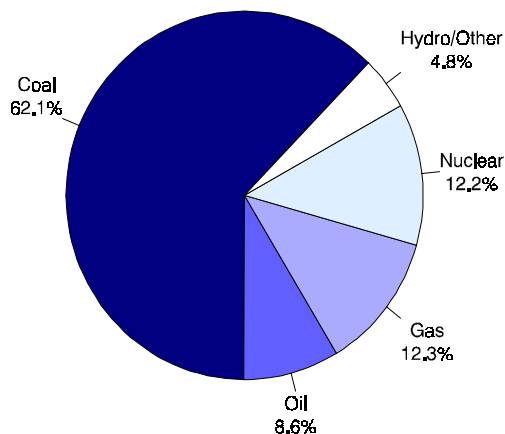
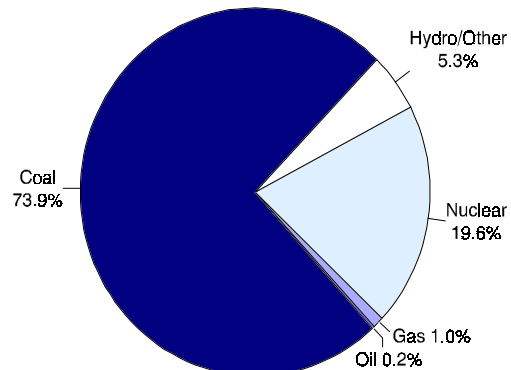
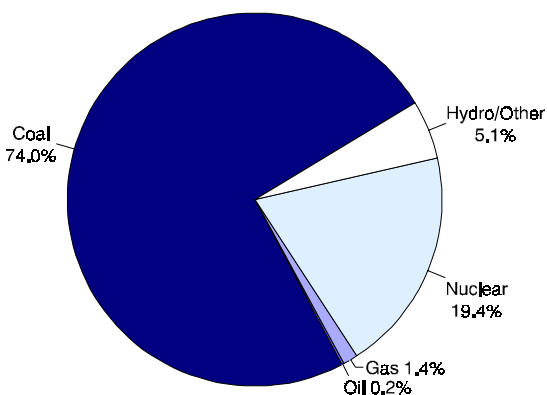
Figure 1. Utility Generating Capability by Primary Energy Source, 1996**Figure 2. Utility Generation by Primary Energy Source, 1996****Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996**

Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	7,450	7,082	7,375	64.1	67.4	62.1
Oil	1,143	970	1,020	10.4	9.2	8.6
Gas	299	395	1,456	2.7	3.8	12.3
Nuclear	1,547	1,509	1,449	14.1	14.4	12.2
Hydro/Other	501	548	567	4.6	5.2	4.8
Total Utility	10,939	10,504	11,867	100.0	100.0	100.0
Total Nonutility	W	499	582	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	29,100,218	33,489,286	38,144,842	68.0	71.0	73.9
Oil	108,541	62,162	124,088	0.3	0.1	0.2
Gas	104,623	179,793	540,404	0.2	0.4	1.0
Nuclear	11,199,272	10,991,419	10,121,355	26.2	23.3	19.6
Hydro/Other	2,272,296	2,426,158	2,720,746	5.3	5.1	5.3
Total Utility	42,784,949	47,148,818	51,651,435	100.0	100.0	100.0
Total Nonutility	W	2,156,537	2,812,036	--	--	--

-- = Not applicable. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.323	0.359	0.411	68.5	71.0	74.0
Oil	0.002	0.001	0.001	0.3	0.2	0.2
Gas	0.002	0.003	0.007	0.4	0.5	1.4
Nuclear	0.121	0.118	0.108	25.7	23.3	19.4
Hydro/Other	0.024	0.025	0.028	5.0	5.0	5.1
Total Utility	0.471	0.506	0.555	100.0	100.0	100.0
Total Nonutility	W	0.074	0.094	--	--	--

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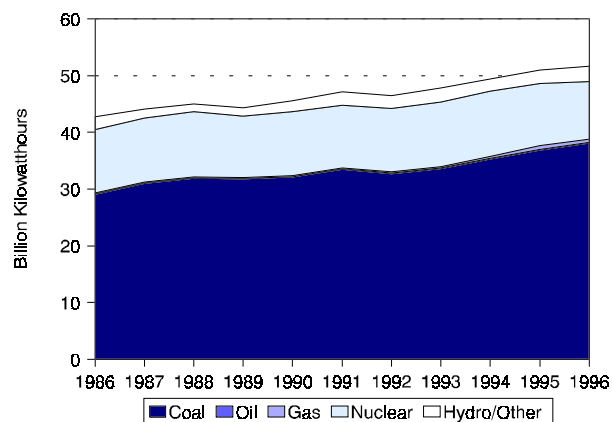
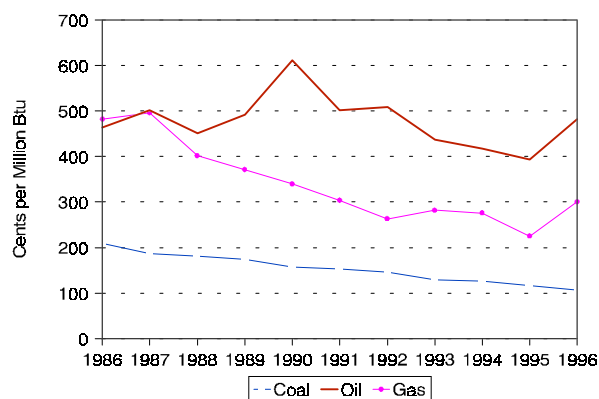
Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996**Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996**
(1996 Dollars)

Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	209.6	152.7	106.0	-6.6
Oil	464.3	501.1	481.6	0.4
Gas	482.1	303.8	300.6	-4.6

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

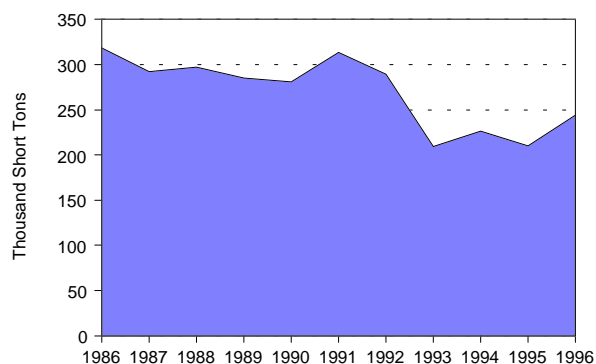


Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	318	313	244	-2.6
Nitrogen Oxides ^d . .	159	181	187	1.7
Carbon Dioxide ^d . . .	33,724	44,034	52,458	4.5

Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

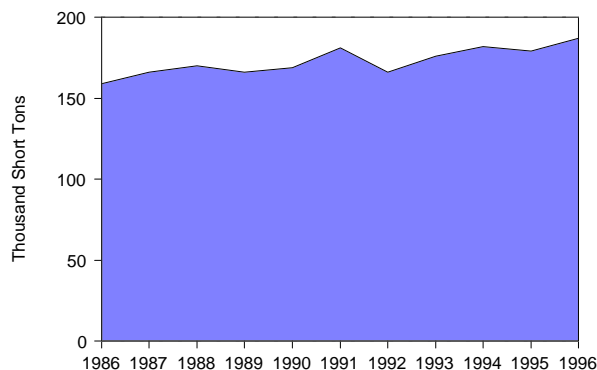


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

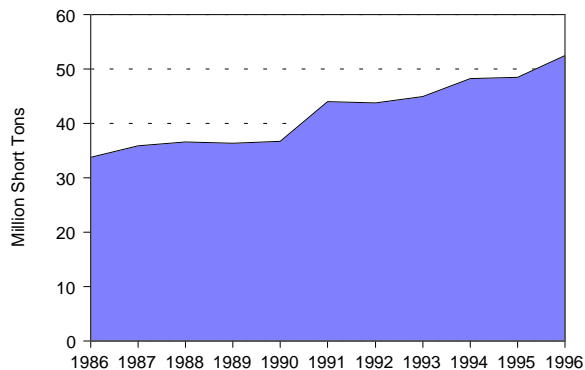
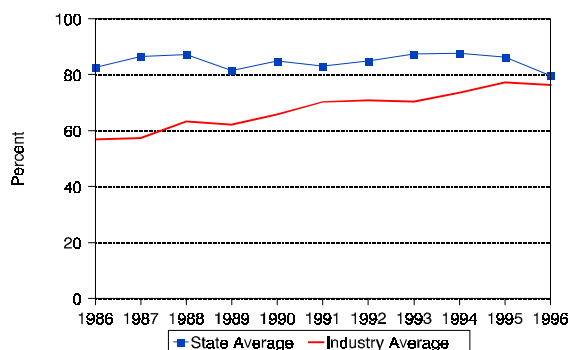


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	16,556,774	17,349,467	18,684,891	1.2	35.5	34.0	31.8
Commercial	11,471,084	13,308,794	15,433,148	3.0	24.6	26.1	26.3
Industrial . . .	17,798,591	19,685,677	23,870,906	3.0	38.1	38.6	40.6
Other	858,383	688,270	754,683	-1.3	1.8	1.3	1.3
Total	46,684,829	51,032,208	58,743,628	2.3	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996**Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996**

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	15	83	--	29	127
Number of Retail Customers	1,938,353	196,975	--	169,518	2,304,846
Retail Sales (MWh)	40,284,242	4,302,193	--	2,098,394	46,684,829
Percentage of Retail Sales	86.3	9.2	--	4.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,977,388	282,859	--	199,036	3,459,284
Percentage of Revenue	86.1	8.2	--	5.8	100.0
1991					
Number of Utilities	12	82	--	27	121
Number of Retail Customers	1,901,402	208,559	--	181,979	2,291,940
Retail Sales (MWh)	43,108,943	5,512,727	--	2,410,538	51,032,208
Percentage of Retail Sales	84.5	10.8	--	4.7	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,633,220	298,731	--	194,562	3,126,513
Percentage of Revenue	84.2	9.6	--	6.2	100.0
1996					
Number of Utilities	12	82	--	26	120
Number of Retail Customers	2,031,912	226,686	--	198,759	2,457,357
Retail Sales (MWh)	49,331,680	6,634,505	--	2,777,443	58,743,628
Percentage of Retail Sales	84.0	11.3	--	4.7	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,582,095	303,054	--	199,294	3,084,443
Percentage of Revenue	83.7	9.8	--	6.5	100.0

-- = Not applicable.